MIM EXPLORATION PTY LTD

TECHNICAL REPORT

No. 1969

TITLE
EXPLORATION LICENCE 7525 "JUMPUP"
NORTHERN TERRITORY
FINAL REPORT
YEAR ENDED : 11TH SEPTEMBER 1993

ISSUING DEPARTMENT
EXPLORATION

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INVESTIGATIONS CONDUCTED BY
BRISBANE BASED MIM EXPLORATION STAFF

SUBMITTED BY
R D M WILSON
CONTENTS

1. INTRODUCTION AND SUMMARY

2. LOCATION AND ACCESS

3. TENURE

4. REGIONAL GEOLOGY
   4.1 Tawallah Group
   4.2 Structure

5. PREVIOUS EXPLORATION

6. EXPLORATION CONDUCTED BY MIM EXPLORATION PTY LTD
   6.1 Airborne Geophysics
   6.2 Ground Geophysics
   6.3 Geological Mapping
   6.4 Aerial Photological Lineament Study

7. CONCLUSIONS

8. REFERENCES
APPENDICES

APPENDIX 1: PROTEM DATA

TABLES

TABLE 1: PREVIOUS COMPANY REPORTS COVERING:
EL7525 "JUMPUP"

FIGURES

FIG. 1: LOCATION MAP

FIG. 2: WORK BY MIM EXPLORATION IN 1992

LIST OF DRAWINGS

<table>
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EXPLORATION LICENCE No. 7525 "JUMPUP"

NORTHERN TERRITORY

FINAL REPORT : YEAR ENDED 11th SEPTEMBER 1993

1. INTRODUCTION AND SUMMARY

Exploration Licence No. 7525 "Jumpup" is located approximately 985km by road SE of Darwin and about 65km NW of Borroloola. The Licence covers approximately 81km$^2$, is one of several currently held by Mount Isa Mines Limited in the McArthur Basin. "Jumpup" was granted for six years on 11th September, 1991.

The tenement covers the Middle Proterozoic Tawallah Group. A northerly trending splay from the Emu Fault to the east, is thought to pass through the centre of the Licence area. This geological situation suggests "Jumpup" has potential for stratiform or other base metal deposits. The area has been explored in the past for base metals, phosphate and uranium with little result.

During 1992, MIM Exploration Pty Ltd (MIMEX) completed PROTEM follow up of a broad QUESTEM anomaly. Follow-up on the ground by PROTEM suggested that the source of the conductive response is most likely due to near surface weathering, possible of lateritic origin.

Geological mapping and an air photo lineament study were completed. They work defined a number of previously unrecognised outcrops of Warramana Sandstone, Wollogorang Formation and Settlement Creek Volcanics. Many of these outcrops are fault bounded and contain shears and tectonically brecciated zones.

The discouraging PROTEM and mapping results has lead to EL7525 being relinquished.
2. LOCATION AND ACCESS

The Licence area lies on the Tawallah Range (6066) 1:100 000 scale topographic map, approximately 65km NW of Borroloola and 620km, from SE of Darwin, Northern Territory. The EL is enclosed within latitudes 15°40'S and 15°45'S and longitudes 135°47'E and 135°52'E (Fig. 1).

Access to EL7525 is by the Stuart Highway from Darwin to Daly Waters, the Carpentaria Highway to Borroloola and along the Bing Bong road for approximately 72.5km to the Licence turn-off.

Within the area, access is limited to a few dirt tracks which follow BHP's old surveyed grid lines. Cross-country traverses are difficult due to the low and thick nature of the scrub. The terrain is sandy with minor black soil and paperbark swamps. Topographically the majority of the area is flat lying, cut by deep creek gullies. High (up to 180m ASL) dissected hills and ridges occur in the west of the EL.

3. TENURE

Exploration Licence No. 7525 "Jumpup" was applied for on the 24th June 1991, and granted to Mount Isa Mines Limited on the 11th September, 1991 for a term of six years. The area covered is 25 one-minute graticular blocks, which equals 81km². The NTDMEx expenditure commitment for the second year is $10 000. There are no unusual conditions or requirements attached to the Licence.

This Licence was surrendered on 23rd July, 1993.

4. REGIONAL GEOLOGY

EL7525 "Jumpup" is located on the Mt Young 1:250 000 (SD53-15) and Tawallah Range 1:100 000 (6066) geological sheet areas. The sequence of interest in the region is the McArthur Group - a stratigraphic equivalent of the ore-bearing sequences in the Mount Isa District. Important base metal deposits within the North Australian Craton are all hosted by this Group or its equivalents.

The McArthur Basin contains a thick platform-cover sequence overlying the eastern edge of the North Australian Craton which consists of Lower Proterozoic basement rocks (Jackson et al 1987) and has a stratigraphic succession similar to the Lawn Hill Platform and Mount Isa Orogen. The basin contains four rock groups: Roper (youngest), Nathan, McArthur and Tawallah (oldest). Only the Tawallah Group will be briefly discussed below as it bears direct significance to the Exploration Licence.
Fig. 1.

LOCATION MAP
4.1 Tawallah Group

The Tawallah Group is the oldest group in the McArthur Basin consisting mainly of thick sequences of ridge-forming sandstones alternating with units of recessive volcanics and fine-grained clastics (Pietsch et al., 1991). It is unconformable on the Scrutton Volcanics and is unconformably overlain by the McArthur Group. The Group has a maximum thickness from 4500 to 5200m.

4.2 Structure

The McArthur Basin is dominated structurally by the Batten Fault Zone, a north-trending zone 50-70km wide and flanked by the Wearyan Shelf to the east and the Bauhinia shelf to the west. This zone is thought to represent the site of a former syndepositional graben or half graben. Deformation of the Basin has mainly been in response to block-faulting along the Batten and Wapunga Fault zones causing the reversal of the graben structure into a horst or anticlinorium. This has resulted in the exposure of the Scrutton Volcanics in the middle of the Batten Fault Zone (Jackson et al., 1987).

Broad folds and warping, drag folds, steep tilting, shearing, brecciation, veins and solution alteration effects can all be attributed to faulting. The faults have considerable strike-dip and strike-slip displacement with tension gashes in the Emu Fault Zone indicating right-lateral displacement of unknown magnitude (Jackson et al., 1987).

5. PREVIOUS EXPLORATION

In the late 1950's Mount Isa Mines Limited (AP510 and AP1748) and Geopoko Ltd (AP1438) held various portions of EL7525 "Jumpup" (Table 1). Stratiform base metals were their primary target with phosphate and uranium being of secondary concern. Both companies considered the base metal potential of the "Jumpup" area as unprospective, and no work was conducted after initial reconnaissance.

In 1968, Australian Ore and Minerals Ltd covered the north-eastern corner of the present tenement area under AP2357. Layton and Associates were contracted to undertake the exploration for phosphate and uranium mineralisation. After extensive literature search and ground follow up of airphoto anomalies proved disappointing the area was relinquished in 1969.

The central southwestern portion of EL7525 was held by RABAC Exploration Concession in 1970. AP2554 was the subject of an intensive Side Looking Airborne Radar (SLAR) survey looking for a base metal or uranium deposit. The technique delineated two major fault zones in the present tenement area. Both of these fault zones trend northeast - southwest. In addition to these a host of fracture patterns were defined in a number of directions. Limited ground follow up was conducted over the next two years with little success. In 1972 the area was relinquished.
# TABLE 1

OPEN FILE COMPANY REPORTS COVERING:
EL7525 "JUMPUP"

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<td>BHP Minerals Ltd</td>
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Metals Investment Holdings Ltd held the north-eastern corner of "Jumpup" under AP3069 from 1970-71. A stratified base metal or uranium deposit was sought. Geological and structural mapping lead to sedimentological facies analysis of the most favourable lithologies. No mineralisation was delineated so the tenement was relinquished in 1971.

Australian and New Zealand Exploration Company in 1977 held the southern portion of "Jumpup" for manganese exploration. Interpretation of Landsat images and airphotos in conjunction with geological mapping indicated that economic manganese potential in the area was low. The AP was relinquished in 1978.

In 1978 the majority of EL7525 was held under EL1710 by Western Mining Pty Ltd. The target was a stratiform Cu-Pb-Zn deposit. Based on detail aerial interpretation and geological mapping, forty-nine soil traverses (traverses 9-11 are in the present tenement area) were completed. An orientation airborne INPUT-EM survey was also flown. Nineteen INPUT-EM anomalies were defined and indicated that the best host for base metal mineralisation was the Wollogorang Formation of the Tawallah Group. In follow up exploration IP and TEM geophysical techniques were used to define the presence of the Wollogorang Formation. Two anomalous zones are contained in "Jumpup": R1-11 and R1-2. Five percussion drill holes were sunk into R1-11 to test weak IP and TEM anomalies. Drilling defined a black carbonate unit and porphyritic trachyte. Weak pyrite and chalcopryte were also reported. The anomalies were interpreted to be due to deep weathering (up to 30m). No drilling was done on R1-2. In 1981-82 three lines of ironstone and rock chip sampling, and a limited IP survey were completed to the south of R1-11 and west of R1-2. Although ironstone, rock chip and drill chip samples assayed up to 800ppm Cu it was felt that high background Cu values were indicative of the Wollogorang Formation and consequently the area was relinquished in 1983.

In the middle to late 1980's small portions of EL7525 were held by A O (Aust) Pty Ltd (EL2072 - stratiform base metal), CRA Exploration Pty Ltd (EL4083 - diamonds) and BHP Minerals Ltd (EL4745 - stratiform base metals). Very limited work was conducted by all three in the present tenement area and no anomalies were defined. The licences were surrendered in 1981, 1985 and 1986 respectively.

The Tawallah Range 1:100 000 Sheet has been covered by airborne magnetics. The map, prepared by the NTGS, includes data from two sources:

(a) NTGS survey with the following specifications:

- **Contractor**: Aerodata Holdings Ltd
- **Line Directions**: 90° and 270°
- **Line Spacings**: 500m
- **Mean Terrain Clearance**: 100m
- **Date**: 1990
(b) BHP survey with the following specifications:

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Both surveys used caesium vapour magnetometers with 0.04nT resolution and 0.2 sec cycle rate.

6.0 EXPLORATION CONDUCTED BY MIM EXPLORATION PTY LTD

Figure 2 outlines the area explored and methods utilised by MIMEX in 1992.

6.1 Airborne Geophysics

During 1992 a QUESTEM survey was flown, and the magnetics re-modelled. The QUESTEM defined a broad anomalism in the northeast of the tenement and the magnetics showed three belts of moderate magnetic activity. There is little positive correlation between the QUESTEM and the magnetics.

The QUESTEM anomaly remained unexplained by the end of the 1992 field season, and the magnetic responses were attributed to shallowly buried basic volcanics, float of which can be seen in these areas.

Interpretation of this data has been reported previously.

6.2 Ground Geophysics

In August 1992 two traverses of ground EM soundings were acquired to follow up an QUESTEM anomaly (Fig. 2). The survey specifications are given below:

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<tr>
<td>TX Loop size</td>
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<tr>
<td>Configuration</td>
<td>One in loop sounding and two out of loop soundings</td>
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<tr>
<td>Station spacing</td>
<td>500m (in-loop readings)</td>
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EL7525 "JUMPUP"

**LEGEND**

- PROTEM LINES
- TRACKS
- QUESTEM ANOMALY
- AREAS OF VOLCANIC ROCK

**SCALE = 1:100 000**

Fig. 2:

WORK BY MIM EXPLORATION, 1992
The loop configuration is figured below:

![Diagram](image)

The data (Appendix 1) was interpreted using 'GRENDL', the layered earth inversion algorithm developed by the CSIRO. The inverted data for the northern line (Drawing Nos. 41074 & 41075) indicates that the QUESTEM anomaly is sourced by a shallow conductive layer i.e. within 10 m of surface. This has been attributed to a conductive horizon within the laterite profile. The second profile indicates a lateral variation in conductivity, within the top 50m of surface. This is interpreted to be a variation in the regolith and is not considered significant in terms of base metal mineralisation.

6.3 Geological Mapping

Geological mapping defined a number of previously unknown exposures of Warramana Sandstone, Wollogorang Formation and Settlement Creek Volcanics (Drawing No. 33988). The Settlement Creek Volcanics are redistricted to the creek beds while the Warramana Sandstone outcrops in creek beds and as rubble exposures on the sandy plains and hill sides.

Occasional pyrite mineralisation was noted in the Wollogorang Formation and Settlement Creek Volcanics. No evidence of base metal mineralisation was observed.

6.4 Aerial Photological Lineament Study

The airphoto study identified a number of northeast - southwest and northwest - southeast lineaments (Drawing No. 33987). Many of the outcrops of the geological exposures are fault bounded, and shears and fault breccias are common.
7. CONCLUSIONS

Ground follow-up of the QUESTEM anomaly by PROTEM indicates that the responses are most probably caused by a near surface weathering feature either laterite or decomposed of basic volcanic rocks.

The geological mapping and aerial photological lineament study have not defined any areas of sulphide mineralisation.

On the basis of the exploration work conducted to date, little potential is seen in EL7525 to host a stratiform base metal deposit and accordingly the Licence has been relinquished.

Derrick Kettlewell
Project Geologist
8. REFERENCES


APPENDIX 1

PROTEM SOUNDING DATA
FOR LINES:
8266000N & 8267700N
EL7525 "JUMPUP" EM-37 PROTEM, JUNE 1992
LINE - 8266000N

Units : (nV/Am\(^2\)), Loop area : 90 000, F : P25, Initdelay : .161, C : I, NCH : 20

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EL7525 "JUMPUP" EM-37 PROTEM, JUNE 1992
LINE - 8267700N

Units : (nV/Am\(^2\)), Loop area : 90 000, F : P25, Initdelay : .161, C : I, NCH : 20

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DRAWINGS
GEOLOGICAL LEGEND

Nyanantu Beds
Coarse-grained pebbly sandstone and cobbly-boulder conglomerate, immature, poorly sorted, lithic, abundant angular to rounded pebble spherulitic rhyolite clasts, minor red aphanitic rhyolite tuff, flow banded.

Warramunga Sandstone
Dominated by medium-grained, lithic, feldspathic and quartz-rich sandstone; lower red haematitic medium to thick-beded sandstone is separated from upper white fine- to medium-beded sandstone by pelititic; massive haematite; abundant Rugose cross-beds, uncommon mudstone-interbedded intraclasts, ripple marks, biotectonic pseudomorphs, folding, bouding, pseudo-hypsic weathering pattern.

Wallaroo Formation
Interbedded buff fine-grained, flaggy sandstone and red-brown mudstone, micaceous and dolomitic; abundant soft sediment deformation features, fining upward, eutectite casts and mud clasts. Underlying, fine to coarse-grained, thin to medium-beded, lithic and feldspathic sandstone, trough cross-beds, ripple marks and mud clasts, rare basal polymict conglomerate.

Settlement Creek Volcanics
Basaltic-doleritic lavas, reddish-brown to dark grey, sparsely drilled, abundant to amygdalian, generally potassium metasomatised rhyolite tuff and volcanic rock, red-brown banded and aluminous.

Wurunmamgulsa Sandstone
Sandstone, red-brown to purple, haematitic, rarely feldspathic or lithic, medium to fine-beded, moderately well sorted, thin to thick-beded with bedding terminations, fining upward, abundant ripples and shale clasts, dypsaceous bands, thin, red-brown mudstone overtops.

Worawurla Member
Fine-grained and rarely medium-grained sandstone, and mudstone; mottled brown to green, very thin to medium-beded, typically felsic, very fine to medium-grained feldspathic, lithic and micaceous, soft weathered deformation features, ripple and bedform casts, rare basal polymict conglomerate.

Sly Creek Sandstone
Quartzite, white to pale pink, fine to medium-grained and thin to very thick-beded with rare quartz pebble beds and conglomerate bands; medium to large scale trough cross-beds and channels, channel lag deposits, lapses, dolosae, mud clasts, rare desiccation cracks and heumitions cross-stratification, minor thinly bedded mudstone, commonly micaceous, minor basal lavas.

Roiye Creek Sandstone Member
Sandstone, very fine to very coarse-grained and rarely conglomeratic; generally moderate to poorly sorted, sometimes biotectonic-sorted, in places feldspathic, argillaceous, micaceous or gneissic, quartzose, feldspathic, felsic and haematite, eutectite casts, ripple and trough cross-beds, rare intraclasts cracks, biotectonic quartz nodules, psammitic breccia, psammites and boudin pseudomorphs, mudstone, red, felsic and micaceous, commonly laminated.

Segal Volcanics
Basalt lava, amygdaloidal and massive, in part hydroclastic

(Reported from: N.T.G.S. 10932)

LEGEND
Geological Boundary
Lineament

SCALE: 1:50,000
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